

May 1876. Mr. Burnham, *Catalogue of Red Double Stars*. 331

On the Visibility of Oberon and Titania.

By George R. Rogerson, Esq.

Referring to Mr. Webb's communication to the Society at the meeting held on the 12th ult., on the subject of Mr. Ward's observations of the two exterior satellites of *Uranus*, Mr. R. C. Johnson (recently elected a Fellow of the Society) on the 25th of January, 1871, at 8.30 P.M., with a 9-inch silvered glass Newtonian by Browning, distinctly saw the two exterior satellites. The powers used varied from 200 to 650. Both were easily seen at once without previous knowledge of their positions, and *Titania* seemed only very slightly fainter than *Oberon*. Mr. Johnson frequently observed them afterwards, but considered them so easy to find that he only once entered them in his Note-book. Mr. Johnson tried to find the inner satellites, but, of course, without success.

Mr. Johnson thinks that with an 8 or $8\frac{1}{2}$ -inch aperture they would be perceptible.

Waterloo Cottage, Liverpool,
1876, May 11.

A Catalogue of Red Double Stars.

By S. W. Burnham, Esq.

The following is a list of Double Stars situated within 121° of the North Pole, where one of the components has been set down as red in a greater or less degree, and is intended to include only such stars as are not found in the revised and enlarged edition of Schjellerup's *Catalogue of Red Stars*. These objects depend largely for their insertion here upon the authority of Sir John Herschel, and his partiality for red tints, long ago remarked, should be borne in mind, as in some cases later examination by other observers has shown the colours to be much less decided, or almost entirely wanting; but I have thought it better for the present to make the list nearly complete, leaving the work of making from all sources of information a carefully selected Catalogue of stars really red to some one more specially interested in this subject. Incidentally I have found many of these pairs from time to time, and in some instances have failed to notice any very positive red colour, but as these observations had for the most part a different object in view, I do not regard them of sufficient value to be recorded here.

The measures and magnitudes are generally from the Double Star Catalogues from which the pairs are taken.

Chicago, 1876, April 15.

No.	Designation.	R.A. 1880. h m s	Decl. 1880. ° ' "	Pos.-Ang. °	Distance. "	Mags.	Notes.
1	ζ 8 <i>Ceti</i> 27	0 5 25	- 3 45	292° 6	7' 31	7.2...8.8	<i>Subflava</i> ; <i>cinerea</i> : Struve. Both red: South and Herschel.
2	ζ 11 ...	0 8 20	+ 77 21	192° 1	7' 95	8.2...10.7	8.2 <i>subflava</i> : Struve. Large star <i>very red</i> : Hers.
3	ζ 46 55 <i>Piscium</i>	0 33 36	+ 20 47	192° 7	6' 37	5.0...8.2	<i>Egrogie flava</i> ; <i>eg. cerulea</i> : Struve. <i>Yellow</i> ; <i>deep red</i> : Dembowski.
4	H. 626 W ² O. 986	0 39 7	+ 31 1	330°	20' ±	9...14	Large star <i>very red</i> : Herschel.
5	H. 628 W ² O. 1137	0 45 25	+ 33 14	65° ±	35' ±	7...16	Large star <i>very red</i> : Herschel.
6	H. 1066 O ² Arg. 1080	0 59 1	+ 62 2	302° 2	6' ±	9...14	Large star <i>ruddy</i> ; small more so: Herschel.
7	H. 2079 Arg. (52°) 434	1 38 33	+ 52 50	300° ±	8' ±	9-10...15	Large star <i>very red</i> : Herschel.
8	H. 3461 ε <i>Sculptoris</i>	1 40 1	- 25 39	72° 5	3' ±	6...10	Large star <i>white</i> ; small <i>dull red</i> : Herschel.
9	ζ 163 O ² Arg. 2027	1 42 35	+ 64 16	33° 6	34' 93	6.2...8.2	<i>Rubroaurea</i> ; <i>cerulea</i> : Struve.
10	H. 644 W ¹ I. 736	1 42 22	+ 7 5	277°	15' ±	8...14	Large star <i>very red</i> : Herschel.
11	ζ 188 <i>rej.</i> ...	1 50 47	+ 62 20	236° 6	40' ±	9...10	Very red; fine green: Herschel. (4th Cat.)
12	H. 647 W ¹ I. 980	1 56 18	+ 7 6	50° ±	30' ±	10...10-11	Large star <i>deep blood red</i> , a very intense and remarkable colour; small star <i>green</i> : Herschel. The principal star is 9 mag. in Weisse. Position-angle appeared too large, and colour not very striking with 6-in.: Burnham.
13	H. 2129 Arg. (76°) 79	2 15 50	+ 76 40	159° 4	10' ±	10...14	Large star <i>very red</i> : Herschel. In Arg. mag. 9.5.
14	H. 652 ...	2 26 7	+ 9 3	320° ±	2½' ±	10...10+	Elegant; <i>both ruddy</i> : Herschel.
15	H. 653 W ² II. 598	2 26 26	+ 30 53	43° ±	17' ±	9...12	<i>Orange red</i> ; <i>blue</i> : Herschel.
16	H. 2146 ...	2 29 30	+ 76 18	82° 5	30' ±	10=10	Both stars <i>red</i> : Herschel.

17	H. 2166	...	2 53 55	+ 75 19	251.3	40' ±	8.9...10	Large star <i>very ruddy</i> : Herschel.
18	H. 2168	...	2 56 30	+ 70 58	294.1	12' ±	10...11	Large star <i>very red</i> : Herschel.
19	H. 2173	L. 5686	3 2 13	+ 73 25	164.3	25' ±	6-7...12	Large star <i>very ruddy</i> : Herschel.
20	Σ 416 <i>rej.</i>	...	3 28 2	+ 19 24	44.7	25' ±	9...10	<i>Red</i> ; <i>blue</i> : Herschel (5th Cat.)
21	H. v. 13	φ <i>Tauri</i>	4 12 58	+ 27 4	241.8	55.9	6...8½	<i>Light red</i> ; <i>cerulean blue</i> : Smith. <i>Red</i> ; <i>bluish</i> : South and Herschel.
22	H. 344	Arg. (33°) 883	4 28 26	+ 33 41	95' ±	10' ±	10...14	Large star <i>very red</i> ; small <i> dusky red</i> : Herschel. An observation in 7th Cat. gives magnitudes 8...9. Feb. 1876, <i>reddish</i> ; magnitudes 8½...14: Burnham. The largest star is 8.4 mag. in Arg.
23	Σ 579	...	4 34 32	+ 22 30	30.1	16.48	8.5...10.7	8.5 <i>rubroflava</i> : Struve.
24	H. 2244	Rad. 1356	4 52 16	+ 69 12	166.	100' ±	9...9	Both stars <i>remarkably red</i> : Herschel. The other star is R. 1357.
25	Σ 649	W ¹ IV. 1399	5 2 35	- 8 49	80.8	21.59	7.0...8.7	<i>Alba</i> ; <i>cerulea</i> : Struve. <i>White</i> ; <i>very ruddy</i> : Herschel (<i>Cape Obs.</i>)
26	Σ 648	W ² IV. 1453	5 3 14	+ 31 53	74.3	4.68	7.4...8.1	<i>Sulflava</i> ; <i>subcerulea</i> : Struve. In two observations Dawes calls the large star <i>red</i> , or <i>reddish</i> .
27	H. 3752	P. V. 70	5 16 51	- 24 54	110.1	2.86	6...8	<i>White</i> ; <i>red</i> : Smyth.
28	H. 701	Arg. (31°) 992	5 22 48	+ 31 25	...	...	9...15	Large star <i>very red</i> : Herschel. The mag. in Arg. is 7.1.
29	Σ 724	W ¹ V. 530	5 23 36	+ 10 55	241.5	6.86	8.7...10	Small star <i>very red</i> : Herschel. (7th Cat.)
30	Σ 783	...	5 37 0	+ 28 58	358.8	9.81	8.0...9.7	<i>Eg. alba</i> ; <i>rubropurpurea</i> : Struve. <i>White</i> : Secchi.

No.	Designation.	R.A. 1880. h m s	Decl. 1880. ° ' "	Pos.-Ang. °	Distance. "	Mags.	Notes.
31	♌ 790 Orionis 187	5 40 5	— 4 19	89° 1	6.82	7.0...9.3	<i>Rubreflava</i> ; <i>caerulea</i> ; colores insignes: Struve.
32	♌ 823 = H. 375	5 51 56	— 7 40	339° 3	7.50	8.5...9.2	<i>Albæ</i> : Struve. <i>Both red</i> : Herschel.
33	H. 3823	5 55 53	— 31 4	131° 5	3 ±	9 = 9	Both stars <i>orange</i> or <i>even red</i> ; very decided colours: Herschel.
34	♌ 840	5 59 48	+ 10 46	247° 2	21.14	6.2...8.5	A and B C } B C <i>rubra</i> ; D ¹ = 0".55 (1857.1): B and C } Secchi.
35	♌ 875	6 6 37	— 13 7	334° 9	6.05	8.7...9.8	<i>Red</i> ; very green: Herschel (<i>Cape Obs.</i>)
36	H. 383	8 34	— 2 39	285° ±	2 ±	10...10	Both very ruddy: Herschel.
37	H. 3845	12 1	— 22 40	51° 3	25 ±	8...12	Large star <i>ruddy</i> : Herschel.
38	♌ 895 <i>rej.</i>	6 14.23	+ 5 48	59° 8	40 ±	8-9...11	In two observations Herschel notes the larger star as <i>red</i> , and <i>very red</i> , and the comp. <i>blue</i> and <i>green</i> . Later the colours are given as <i>orange</i> ; <i>fine blue</i> .
39	H. 725	6 14 24	+ 9 47	75° ±	20 ±	8.9...10	<i>Ruddy</i> ; <i>purplish blue</i> : Herschel.
40	H. 735	6 32 6	+ 35 32	80° ±	3 ±	9...11	<i>Ruddy</i> ; very elegant: Herschel.
41	♌ 983 = H. 403	6 48 14	+ 34 37	36° 6	11.85	7.7...11.7	7.7 <i>flava</i> : Struve. <i>Red</i> ; <i>bluish</i> : Herschel.
42	H. 412	6 59 48	+ 24 22	20° ±	35 ±	7...17	Large star <i>red</i> : Herschel.
43	H. 756	7 14 2	+ 34 55	60° ±	10 ±	9.10...15	Large star <i>red</i> : Herschel. This pair is identical with H. 417, but no mention of colour in that observation.
44	S.B. 198	7 20 36	— 20 43	212°	3.5	8...11	Large star <i>red</i> : Burnham.

45	H. 2391	O ¹ Arg. 6862	7 23 9	-26 36	292.2	15' ±	8-9...14	Large star <i>very red</i> : Herschel.
46	H. 3973	...	7 26 36	-20 41	36.3	8' ±	9...10	Pure <i>white</i> ; remarkable <i>brick red</i> : Herschel.
47	H. 772	...	7 54 0	+35 46	35' ±	5' ±	11...12	A red star 7 ^m 2 ^s distant in the direction of 120°: Herschel.
48	Σ 1202	P. VIII. 13	8 6 59	+11 13	325.3	20.3	77...9.8	Binary; 77 <i>alba</i> : Struve. <i>Reddish</i> : Dawes.
49	S.B. 207	L. 17091	8 33 44	-19 19	103.5	4.40	6.5...10.5	Decidedly <i>reddish</i> : <i>blue</i> (?): Burnham.
0	H. 110	α ² <i>Cancri</i>	8 51 54	+12 19	320' ±	10' ±	4-5...20	<i>White</i> ; <i>red</i> : Herschel. Dembowski has measured this with 7½-in., and calls the small star 11.0 mag. of Struve's scale.
51	H. 121	...	9 7 9	+10 21	70' ±	1' ±	10...	Both <i>red</i> : Herschel.
52	Σ 1371	W ² IX. 615	9 29 10	+ 4 27	279.8	7.11	8.0...10.5	Small star <i> dusky red</i> ; a very remarkable colour: Herschel (5th cat.)
53	H. 149	...	9 54 46	+ 5 36	265' ±	30' ±	...	<i>Red</i> ; <i>purple</i> : Herschel.
54	H. 159	W ¹ X. 209	10 14 3	+11 57	15' ±	35' ±	8...10	<i>Red</i> ; <i>blue</i> : Herschel.
55	H. 183	W. XI. 529	11 31 48	+13 37	20' ±	60' ±	...	<i>Red</i> ; <i>bluish</i> : Herschel. In Weisse, 8 mag.
56	H. 506	...	11 32 26	+38 51	135' ±	15' ±	7...15	Large star <i>red</i> : Herschel. There is certainly no such star in this place. Exactly 1° North is a yellowish 7 mag. star, but I could not see any companion with 6-in., though carefully looked for. There is nothing in H.'s place brighter than about 10 mag.
57	H. 1201	B.A.C. 4005	11 44 48	+12 54	189.0	12' ±	6-7...13	Small star <i>red</i> : Herschel. The principal star 6 mag. in Arg.
58	H. v. 121	12 <i>Comæ</i>	12 16 28	+26 31	168.2	66.1	5...8	<i>Straw-yellow</i> ; <i>rose-red</i> : Smyth.
59	Σ 1664	W ¹ XII. 508	12 32 6	-10 51	254.7	19.44	7.7...8.8	<i>Flava</i> ; <i>cærulea</i> : Struve. <i>Red</i> ; <i>blue green</i> : Herschel (<i>Cape Obs.</i>)

No.	Designation.	R.A. 1880. h m s	Decl. 1880. ° ' "	Pos.-Ang. °	Distance. "	Mags.	Notes.
60	H. 1221	12 37 56	+74 11	260° ±	...	...	Fine coarse double star. <i>Red</i> ; <i>blue</i> : Herschel.
61	... Lac. 5686	13 42 15	-27 46	110° 2	77	7...10	A beautiful deep red or crimson star, with a distant bluish companion. This was found after the completion of this list (April 17, 1876). Called 8 mag. by Arg. and 7.7 in Washington Catalogue, and may therefore be variable. Companion approximately measured.
62	H. 1249	0 ^h Arg. 13508	-15 53	167° 7	6' ±	8-9...11	"The large star a fine red, between rose and garnet. It is rather a florid than a deep blood-red": Herschel. In the 5th Cat. it is described, "large star very high red, between orange and ruby."
63	H. 546	B.A.C. 4777	-12 49	40° ±	30' ±	5.6...11	<i>Red</i> ; <i>blue</i> : Herschel. The correct place is given, Herschel's being erroneous in R.A. and Decl.
64	Sh. 184	54 <i>Hydre</i>	-24 56	136° 7.	10'	5.5...7.5	Red; blue: South and Herschel.
65	Σ 1894	18 <i>Libre</i>	-10 40	38° 7	19' 4	6.0...10.2	6.0 <i>subflava</i> : Struve. <i>Straw colour</i> ; <i>grape red</i> : Smyth.
66	H. 2772	0. Arg. 15242	+45 18	309°	10' ±	9-10...13	<i>Both ruddy</i> : Herschel.
67	H. 4767	...	-26 20	140° ±	30' ±	8½...11	<i>Red</i> ; <i>blue</i> : Herschel.
68	Sh. 239	43 <i>Herculis</i>	+ 8 48	230° 9	80° 09	5...9	<i>Decidedly red</i> ; <i>bluish</i> : South and Herschel. <i>Rose tint</i> ; <i>light blue</i> : Smyth. <i>Golden</i> ; <i>blue</i> : Demb.
69	H. 1294	L. 30509	-24 19	136° ±	18' ±	7...17	Large star <i>red</i> : Herschel.
70	Σ 2110 <i>rej.</i>	56 <i>Herculis</i>	+25 56	96°	15' ±	6½...13	<i>Light yellow</i> ; <i>pale red</i> : Smyth. <i>Reddish</i> ; <i>bluish white</i> : South and Herschel.
71	Σ 2253	W ¹ XVII. 1073	+14 38	80° 4	18' 1	7.5...10.2	7.5 <i>subflava</i> : Struve. Large star <i>red</i> : Herschel.

72	z 2264	95	Herculis	17	56	24	+ 21	36	261.7	6.06	4.9...4.9	Flavusubviridis; flavusubrubra: Struve. 1874. <i>apple-green</i> ; cherry-red: Smyth. <i>Pale red to orange</i> : Dawes.	
73	H. 2832	...	...	18	20	58	- 21	19	15.0	18. ±	9.10...11	Large star <i>very red</i> , almost <i>ruby</i> : Herschel.	
74	z 2319	W ²	XVIII. 607	18	22	30	+ 19	13	191.0	5.61	7.2...7.6	<i>Albe</i> : Struve. Both stars <i>pink</i> : Dawes.	
75	H. 5499	...	...	18	32	10	- 4	25	155. ±	15. ±	9...12.5	Large star <i>very red</i> : Herschel.	
76	H. 1322	...	...	18	33	47	+ 24	33	224.0	18. ±	8...11	Small star <i>ruddy</i> : Herschel.	
77	H. 1337	W ²	XVIII. 1064	18	36	22	+ 31	28	174.9	6. ±	9...12	Small star <i>ruddy</i> : Herschel.	
78	H. 2852	...	...	18	57	16	+ 7	14	134.5	18. ±	10...12	<i>Red</i> ; <i>blue-green</i> : Herschel.	
79	H. 1365	...	...	19	0	21	+ 26	57	327.5	15. ±	9-10...10	<i>Ruddy</i> ; <i>green</i> by contrast: Herschel.	
80	H. 881	Schj.	7257	19	11	43	- 5	38	340. ±	30. ±	7	A and B) Curious case of contrasted colours. Large Band C) star <i>red</i> ; small stars <i>blue</i> : Herschel.	
81	H. 1453	...	...	19	50	41	+ 24	20	227.1	23. ±	9=9	The preceding star <i>reddish</i> : Herschel.	
82	...	...	...	19	55	25	+ 0	20	s.p.	10. ±	9-10...15	<i>Red</i> ; <i>blue</i> : Harvard Zones.	
83	H. 1470	L.	38428	19	59	18	+ 37	59	332.5	25. ±	8-9...10	<i>Ruddy-yellow</i> ; <i>contrasted green</i> : Herschel. <i>Rubra</i> ; <i>cærulea</i> ; colori superbi. Secchi. Mags. 7...8; called "Nova." The double star H. 605 having nearly the same R.A., but Decl. uncertain, given as between 38° and 40°, is undoubtedly identical with this. It is there described as <i>dark red</i> ; purple; P = 340.° ±; D = 20." ±; mags. 9...12. Both stars are observed by Arg. magnitudes 7.2...9.4.	
84	H. 1529	...	...	20	27	0	- 6	38	114.0	25. ±	7.8...11	Large star <i>red</i> : Herschel.	
85	H. 2988	...	...	20	35	52	+ 2	32	139.7	20. ±	9...11	Large star <i>very red</i> : Herschel.	

No.	Designation.	R.A. 1880. h m s	Decl. 1880. ° ' "	Pos.-Ang. °	Distance. "	Mags.	Notes.
86	H. 1582	...	...	...	25' ±	9-10...12	Large star red: Herschel.
87	H. 2985	B.A.C. 6999	+ 38 5	328° 0	60' ±	5-6...13	A <i>ruddy</i> bright star: Herschel.
88	H. 3005	...	+ 3 30	292° 2	18' ±	8-9...12	Large star <i>very red</i> : Herschel.
89	H. 5265	...	- 22 53	196° 7	20' ±	9...9½	<i>Red</i> ; <i>blue</i> : Herschel.
90	Σ 2790	B.A.C. 7417	+ 58 7	46° 5	4' 54	5' 6...9' 9	<i>Eg. rubra</i> ; <i>cærulea</i> : Struve. <i>Orange</i> , 1871: Webb.
91	H. 1650 = O Σ 440	B.A.C. 7476	+ 59 14	189° 6	12' 2	6' 2...11' 0	6' 2 <i>orange</i> ; <i>red</i> : Herschel. <i>Jaune orange</i> : Dembowski.
92	H. 1669	O² Arg. 12555	+ 49 57	239° 8	12' ±	8...13	White; red: Herschel.
93	Σ 2850	...	+ 23 22	263° 2	2' 83	7' 2...11' 2	7' 2 <i>rubroaurea</i> : Struve.
94	Σ 2895	W² XXII. 314	+ 24 21	6° 1	4' 80	8' 5...10' 0	8' 5 <i>flava</i> : Struve. Red: Herschel. (5th Cat.)
95	Σ 2913	W¹ XXII. 477	- 8 44	331° 9	8' 01	7...8	<i>Alba</i> ; <i>subrubra</i> : Struve.
96	H. 296	...	+ 12 32	220° ±	12' ±	9...11	Large star <i>ruddy</i> : Herschel.
97	O Σ 478 = Σ 2942	B.A.C. 7931	+ 38 50	280° 6	2' 80	6' 0...8' 4	<i>Aurorosa</i> ; <i>cinerea</i> : Struve. <i>Coul. d'or</i> ; <i>céndré</i> : Dembowski. <i>B very red</i> : Wilson and Seabroke. Error of 2 ^m R.A. in <i>Mens. Micr.</i>
98	H. 3152	L 44810	+ 10 1	135° 4	3' ±	9...15	Large star <i>very red</i> : Herschel.
99	H. 975	W² XXII. 1133	+ 35 43	235° ±	50' ±	6...9	<i>White</i> ; <i>red</i> : Herschel. This is No. 239 of the Pulkowa Cat. of wide pairs.
100	H. 1839	...	+ 40 29	293° 5	15' ±	10...12	Small star <i>dusky red</i> : Herschel.
101	S.B. 181	<i>Aquarii</i> 286	- 14 3	309° 8	1' 42	7' 0...10' 5	Large star <i>reddish</i> —decided contrast in the two: Burnham. Measures by Dembowski.
102	Σ 3038 = H. 1907	...	+ 62 0	274° 9	4' 36	9...9' 5	<i>Alba</i> : Struve. [Both] <i>very red</i> , almost ruby colour: Herschel.